



## Materials Engineering Branch

### TIP\*



No. 035    Formation of Sulfide Films on Plated Components

Author(s): A. J. Babecki

Contact: (301) 286-6882

---

Silver plating and copper plating develop sulfide compounds ( $\text{Ag}_2\text{S}$  and  $\text{CuS}$ ) when exposed for a period of time to the atmosphere. These sulfide films not only stain the plated surfaces but they also act as electrical insulators.

Silver is sometimes used to plate electrical connector pins and shells, either as a top coat or with an overcoat of gold plating. Copper plating is also used on some electrical hardware as an under-plate for the gold. If the gold plating is thin and porous, sulfurous constituents in the atmosphere can still react with the silver or copper through the pores to create the sulfides which extend through the pores and gradually spread over the surface. Accordingly, silver and copper plating should not be specified for components that require good electrical conduction. Gold plating generally are deposited over a copper flash plating for improved adherence. In such instances, the gold plating (approximately 100 micro-inches in thickness) should be applied as a duplex film (interrupted deposition) to minimize the development of pores that are continuous to the copper (or silver) under-plate.

If assembled spacecraft electrical hardware, such as mounted connectors, develop sulfide films, and if removal of the affected components is not practical, the films can be removed mechanically or chemically. In the case of connectors, repeated matings and dematings will abrade the film to provide good electrical contact. Other components may permit abrasion of the film by a rubber eraser. There are a number of chemical solutions which may be used to remove the sulfides without removal of the plating, one being Elanar Dip.